

Planetary Forecaster
What is Temperature and How Does it Differ Across Earth's Surface?
LS 1.5
Which Locations are Habitable on Earth?

Before You Read

- What is a habitable temperature range on Earth?
- Are there any places on Earth where humans do not live? Why don't they live there?

As You Read

Read the first paragraph on page 29 and the bulletin from the CSA.

- What are the habitable temperature range on Planet X? Why did the CSA choose this range?

Learn About Daily and Monthly Average Temperature

- Think about how you could determine the daily temperature if it was recorded every hour for a 24 hour period. How would you determine the average monthly temperature.

Stop and Think

Use the temperature data on page 31 to answer the following questions.

1. Which day had the highest daily high?
2. Which day had the lowest daily high?
3. Without calculating, estimate which day had the highest average temperature.
4. Calculate the average temperature for each of the three days. Compare your answer to your estimate.
5. Can a day with a high temperature greater than 85°F still have an average temperature that is less than or equal to 85°F? Support your answer.
6. Could a location with any of these average daily temperatures fit the temperature criteria requested by the CSA?

Procedure: Explore the Case on Earth

Use the map on the top of page 32 that shows the average surface temperature for the month of July to help you answer these questions.

1. Identify a region that is habitable according to CSA guidelines. What color is shaded on the map?
2. Identify a region that is not habitable according to CSA guidelines. What color is shaded on the map?
3. What might make a location too hot or too cold to be habitable?
4. Describe the general pattern of temperatures along the Equator.
5. Lorelei noticed that the Equator temperatures were all similar around the whole world. Do you agree with Lorelei? Why or why not?
6. Describe the general pattern of temperatures near the poles.
7. Tim noticed that in July the South Pole was cold but still warmer than the North Pole. Do you agree with Tim? Why or why not?
8. How would you describe the pattern in surface temperatures moving from the Equator to the poles? How would you answer if someone asked you why this was so?
9. Look at the map on the bottom of page 32. The dark areas on this map indicate the areas that are uninhabitable in July. Why would any of these places be uninhabitable?

Now look at a map on page 33 showing average surface temperatures for January. Compare this map to the one for July.

10. Identify a region that is habitable according to CSA guidelines.

11. Identify a region that is not habitable according to CSA guidelines.

12. Which places are habitable in both January and July?

13. Mike noticed that the latitudes along the Equator were about the same temperature on both Monthly Average Temperature Maps. Do you agree with Mike? How would you answer if someone asked you why this was so?

14. Mary noticed that around North America the land and water were different temperatures. She did not notice that on the July map. Do you agree with Mary? How would you answer if someone asked you why this was so?

15. Michelle noticed that the Southern Hemisphere was warmer than the Northern Hemisphere in January. Do you agree with Michelle? How would you answer if someone asked you why this was so?

16. Look at the map at the bottom of page 33. The dark areas on this map indicate the areas that are uninhabitable in July and January. Why would any of these places be uninhabitable?

17. Look at the images at the top of page 34. They are photos of the same place, one taken in winter and one in summer. Why do you think some places experience such wide temperature variations at different times of the year?

18. Look at the image on the bottom of page 34. How do you think there can be snow on a mountaintop at the same time there are spring-like conditions near the base?

19. Look back at the January and July surface-temperature maps. What other factors may cause temperature variations? Observe both surface-temperature maps and record your answer.

Back to the Big Challenge

Read the bulletin from CSA on page 36.

What four factors has the CSA identified to have the greatest on the surface temperatures of Planet X. Describe what you think is meant by each factor.

1.

2.

3.

4.

Update Your Project Board

Discuss the bulletin with your class. As a class, update the *Project Board*, listing any ideas or investigation questions that resulted from the activities you completed. By now you should have some very good ideas about the factors that cause temperature variations. You should also have some evidence to support your ideas. The next steps will be to start asking questions about some of the factors that influence Earth's temperatures. You can then see if these factors will apply to *Planet X* as well.

